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Soil and Water Science Department Seminar

Speaker: **Mary Lusk**
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Title: **Organic Nitrogen Biodegradability and Molecular Characterization in Urban Stormwater and Streams**

Date: Friday, March 27th

Time: 3:15 pm

Location: McCarty Hall A Room G186

Organic nitrogen (ON) can be a significant portion of the reactive nitrogen (N) pool in aquatic ecosystems, and it can be used by both bacteria and phytoplankton to fuel eutrophication and harmful algal blooms. This work addresses the sources and ecological significance of ON in an urban coastal region of the Tampa Bay watershed, where we continue to grapple with water quality degradation problems associated with excess reactive N in aquatic resources and where it is critical that we expand our knowledge of N biogeochemistry so we can implement effective N management strategies. Organic N is being assessed in three parts of the urban watershed: (i) in urban stormwater and an urban stormwater retention pond, (ii) in streams under varying levels of urbanization, and (iii) in soil and soil leachate water from urban fertilized turfgrass. Results to date show that ON is the dominant (>50%) N form in urban stormwater, the retention pond, and in all streams. Using ultrahigh resolution mass spectrometry, it was shown that the urban stormwater and pond water both contain ON compounds within a broad range of expected lability, but that there is a shift towards more labile ON as water evolves from stormwater runoff to outflow from the urban retention pond, indicating that urban retention ponds may be microbial hotspots within the urban landscape that rework the ON into a more labile, or reactive, N pool. A bioassay study of the stormwater and pond outflow confirm this by showing that ON bioavailability increased from to 10 to 40% as the water moved through the pond. In contrast, a stream in the same watershed with 83% urban development had only 5% of its ON as bioavailable, and its molecular characterization indicated that it contains an important pool of lignin-like refractory ON from allochthonous sources such as humified soil organic matter or well-degraded terrestrial plant material. Thus, even under very high levels of urbanization, the stream maintains a predominantly refractory ON pool.

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